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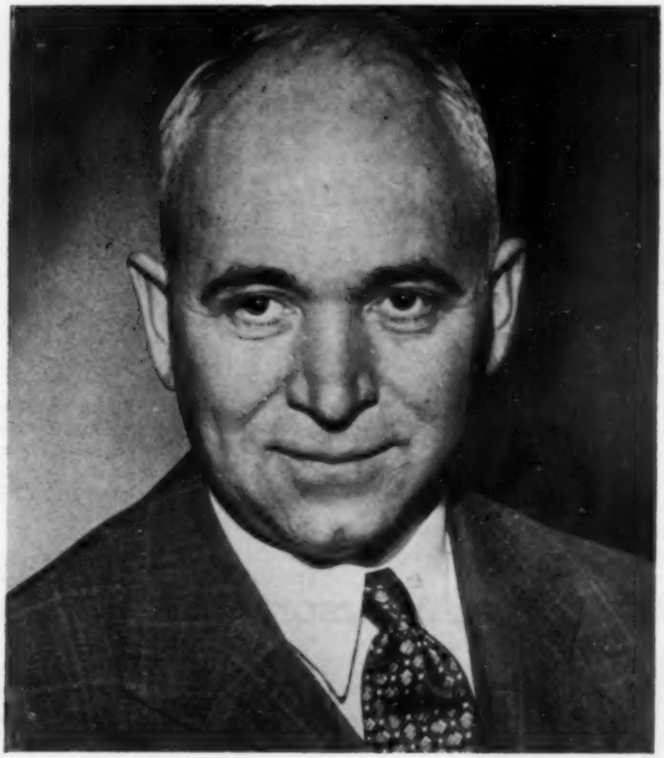

Lawrence Flett, Hon. AIC

Awarded Gold Medal of the American Institute of Chemists.

(See Page 293)

The CHEMIST

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Publication of

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Deadlines for *The Chemist*

The deadline for the August issue of The Chemist is July 10th. Advertising copy for August should be received not later than July 15th.

IN THIS ISSUE

TO COME IN JULY

Other excellent papers presented at the 35th AIC Annual Meeting in Los Angeles, California, will be available. The series by Dr. Maurice J. Kelley, F.A.I.C., on "Understanding the Creative Process" will be completed. The human interest story will be about Harold A. Levey, who received Honorary AIC Membership.

Recommended Suppliers and Services

EDITORIALS

The Originators

Dr. Henry B. Hass, F.A.I.C.

Retiring President of The American Institute of Chemists, Inc.

I SUSPECT that THE AMERICAN INSTITUTE OF CHEMISTS will always be a minority group of originators, the needlers, the independent thinkers, the leaders, the indispensable yeast which, in time, leavens the whole mass.

When a prospective member asks, "Why should I join the INSTITUTE? What is there in it for me?", our answer should be, "If you are content to be a follower, if you do not wish to be one of the minority which pilots the course later to be followed by the others, perhaps you should not join the INSTITUTE. But, if chemistry ever reaches its full stature in the United States, it will be because this group led the way. Leadership has its penalties but, like other virtues, it is its own reward. If this is what you want, we welcome you!"

The Taxpayer and the Student

Dr. D. B. Keyes, F.A.I.C.

Former AIC President

SAID the Taxpayer to the Student: "What this country needs is more taxpayers, regardless of quality, but fewer students of better quality! To keep my bill within reason and to get my money's worth, I cannot afford to pay for the training of the incompetent or the indolent, who, though not good students, often become good producers and thus good taxpayers. Every school in the country should have these words over the entrance:

"This school is for those who *want* an education; others keep out! You who enter are obligated to pay the entire bill either now or later."

Special AIC Announcements

Add to Charter Member List

In the list of AIC Charter Members still with us (page 245, THE CHEMIST, May 1958), the name of Solomon Schneider, Havertown, Pa., was inadvertently dropped out. He is one of the organizers of the Pennsylvania AIC Chapter and he helped to write its Constitution and by-laws.

Twin City Chapter Elects

At the May 16 meeting of the Twin City Chapter, the following officers were elected:

Chairman, Morris Kenigsberg, Supervisor, Manufacturing Process Development, The Toni Co., St. Paul 1, Minn.

Vice Chairman, Dr. Joseph F. Abere, Research Chemist, Minnesota Mining & Manufacturing Co., St. Paul, Minn.

Secretary, Rosemary Klinkenberg, Supervisor, Chemistry Dept., Twin City Testing and Engineering Lab., St. Paul 14, Minn.

Treasurer, Henry L. Weisbecker, Minnesota Mining & Manufacturing Co., St. Paul, Minn.

National Council Representative, John L. Wilson, Vice President and Director, Research & Development Div., Economics Laboratory, Inc., St. Paul 1, Minn.

Alternate Council Representative, Albert C. Holler, Director, Chemical Division, Twin City Testing & Engineering Laboratory, Inc., St. Paul 14, Minn.

Cecil L. Brown Honored

Dr. Cecil L. Brown, F.A.I.C., manager of scientific liaison, Esso Research & Engineering Co., Linden, N. J., received the Honor Scroll of the New Jersey AIC Chapter, May 13, 1958, at its meeting in Newark, N. J.

Manual of Chapter Operations

New Chapter Officers who have not received a copy of the *Manual for Chapter Officers and Councilors,* may obtain one on request to the Secretary's office, The American Institute of Chemists, 60 E. 42nd St., New York 17, N. Y.

New Jersey Chapter Officers

The New Jersey Chapter has elected the following officers for 1958-1959:

Chairman, Dr. Lawrence T. Eby, Senior Market Development Engineer, The Enjay Co., Inc., 1141 East Jersey St., Elizabeth, N. J.

Chairman-Elect, Dr. Joseph H. Dusenbury, Asst. Director of Research, Textile Research Institute, Princeton, N. J.

Secretary, Dr. John F. Mahoney, Manager, Technical Service, Merck & Co., Inc., Rahway, N. J.

Treasurer, Dr. Curt Bamberger, Research Chemist, Patent Chemicals, Inc., Paterson, N. J.

National Council Representative, Dr. William R. Sullivan, General Secretary of Research, Hoffmann-La Roche, Inc., Nutley 10, N. J.

New Application Forms

The new application-for-membership forms prepared by the Committee on Qualifications are now available, and will be sent, with a leaflet about the AIC, to those who request them from the AIC Secretary. On this 35th Anniversary year, we suggest that each member invite a qualified friend to apply for AIC membership!

The Human Side of Chemistry

Lawrence Flett, Hon. AIC
Consultant, National Aniline Division, Allied Chemical Corporation, New York, N. Y.

(Presented when the author received the Gold Medal of The American Institute of Chemists, April 10, 1958, at Los Angeles, California)

WITHOUT chemists, the science of chemistry would exist only on dust-gathering library shelves. It is the chemist who expands our knowledge and puts it to work. In America, science has brought us cherished good health, good food, attractive shelter, and fine clothing; in fact, a pleasant, easy life. Its really great service has been to bring to all our people the comforts and pleasures once enjoyed by a privileged few. Americans only wish that all people of the world might be as happy and as well fed as science could make them.

There are many organizations in this country concerned with science and technology. In contradistinction to these, THE AMERICAN INSTITUTE OF CHEMISTS is concerned with the chemist, who broadens his science and brings its fruits to mankind. While science and technology deal with facts and theories capable of measurement or demonstration, the problems of the chemist are human problems. They deal with such vital things as creativeness, personality, frustration, organization, and education. These things are not subject to exact measurement. This discussion illustrates the interests of the INSTITUTE, with a brief description of five important areas:

(1) *Creativeness*:

Almost everyone has some degree of creative ability which he exercises at home, at play, or at work. In the case of the chemist, his whole accomplishment is based on creativity. Men who lack this ability, though trained to be chemists, can be replaced more easily by trained technicians. Those whose creative ability is enjoyed to the degree that is designated as genius are the people on whom our scientific and industrial progress depend. The true genius is a rare and priceless person. A laboratory is indeed fortunate if it has one such inidividual, because that one can stimulate a hundred others to worthwhile, creative work. There is fortunately a growing realization of the importance of this human characteristic.

One of the greatest problems of organized research is that of recognizing and encouraging genius. Since the genius is also a dreamer, he is frequently confused with the useless dreamer. The loss of the contributions of such gifted people, through misunderstanding, renders original research sterile.

(2) *Information*: Invention, the flash of genius, is not drawn by men from thin air. Inventions and discoveries are made by men who have a great fund of knowledge in the particular field where they work. Since chemists are human, they can only read or study at a limited rate and absorb a limited number of facts. Knowledge of science is expanding a hundredfold faster than one person can master it. This problem of keeping up with the literature exceeds human capabilities. Furthermore, the chemist cannot spend all of his time in study.

One of the really serious human problems of the chemical profession is that of bringing to the chemist the knowledge useful to his work and more important still, to protect him against the flood of knowledge, interesting but irrelevant, which he would like to study, but the grasping of which is beyond human capabilities.

(3) *The Shortage of Chemists*:

Much has been said of the problems America faces in the lack of chemists and other scientific personnel. Paradoxically, the Institute has the human problem of placing chemists in positions where they can do creative work. Either the world must face the problem of making a science career more appealing, or it must get along with fewer chemists by making better use of those it has. Actually it must do both. In this age of shorter working hours, the scientist is faced with the problem of long hours of study. To encourage such devotion, his career must be made attractive. The supply of chemists cannot suddenly be increased; it takes years to make a good chemist and many more years before that to provide the buildings, faculty, and equipment needed to educate him. One of the Institute's human problems is to make certain that good use is made of chemists; that they assume positions where they can do successful, creative work.

(4) *The Shortage of Teachers*:

Behind a great scientist, there is always a great teacher who in some way has kindled the spark of genius within his students. No adequate way has ever been found to properly compensate these teachers, many of whom work for less than their students receive when they leave college. Many support themselves by outside work. Furthermore, most students are supported in part or altogether by parents who must pay substantial taxes on all but a small amount of their contribution to their children's education. In many cases, parents are hard-pressed to keep their children in college at all. Any increase in fees to pay deserved salaries to professors would seriously affect the choice of students. The devotion of our science professors, who stay with their teaching; who are willing to accept the accomplishments of their students as their reward, has been a cornerstone in the prosperity of which they enjoy such a small share.

(5) *Public Understanding*:

American chemists live in a country where the people rule, and so their work will not be understood until science is taught with the 3 R's to the people as a whole. There is still a large group of persons who are easily convinced that the healing herbs of the witch doctor are to be preferred to what they regard as hazardous chemicals. People still enjoy good food but would legislate against the use of the chemicals that make these foods possible. There is an almost inevitable group who would block the use of food supplements in spite of the good health that these supplements have brought. People posing as benefactors of mankind would deny by legislation a healthy future for our children. No chemist should feel that his work stops in the laboratory. When the scientific work is completed, the human problems start. Each and every scientist must do his best to further the understanding of science by non-scientists.

In his career, a president of THE AMERICAN INSTITUTE OF CHEMISTS deals with these and many other human problems. He is always seeking and proposing remedies. Any progress in such large areas is slow and often frustrating; nevertheless, the successes he has are a guiding light to lead him on. Human rewards are often the finest.

In thirty-five years of devoted service to the human side of chemistry, the INSTITUTE, by bringing about a better understanding of human values, has had an important share in the progress of chemistry and its application to our American prosperity.

The Chemist Who Loves People

George L. Parkhurst, F.A.I.C.

Vice President, Standard Oil Company of California, 225 Bush St., San Francisco 20, California

(Condensation of a paper presented when Lawrence Flett received the Gold Medal of THE AMERICAN INSTITUTE OF CHEMISTS, April 10, 1958, at Los Angeles, Calif.)

THE Gold Medal of THE AMERICAN INSTITUTE OF CHEMISTS is awarded annually "for noteworthy and outstanding service to the science of chemistry or the profession of chemist in America." This award has been given to eminent chemists or industrialists. The emphasis, however, is not on eminence, eminent though the medalists have been and are. Rather, the emphasis is on service; service either to the science or to the profession of chemist. In practice the Medal has been awarded to a person who has distinguished himself both by service to the science in which he is a practitioner and to the profession of which he is a member. Certainly

that is true in the case of Lawrence Flett, who has rendered distinguished and outstanding service to his fellow man.

One of the important duties of a man who would serve his science and his profession is to stimulate young people to an interest in a career in science and to assist and inspire young people who have embarked on such a career to carry on in all fullness. Certainly Lawrence Flett has done this in large measure.

Our medalist has made outstanding contributions to our science, our profession, our country, by contributing to world affairs and developing a greater sense of international unity. He has been active not only in a long list of American organizations, but in at least two international ones. Notably, he is a *membre d'honneur,* president of the American Section, and *membre de conseil* of the Societe de Chimie Industrielle.

Our Medal recipient has contributed not only to the science of chemistry but also to the dissemination of knowledge concerning his professional field. He is the author of a long list of technical articles and a number of books, and has given of his time freely and generously as a speaker. Moreover, his interest and activity in the field of dissemination of knowledge and ideas involves editorial work of a type which is time-consuming and can be justified only by a deep sense of service. Mr. Flett has been a member of the Advisory board of *Chemical & Engineering News* and *Industrial & Engineering Chemistry;* he has made similar contributions to our AIC publication, THE CHEMIST, and he is a member of the Advisory Board for Documentation and Communication Research at Western Reserve University.

Mr. Flett is once more an object lesson through his efforts to improve the professional status of chemists and chemical engineers. He is an honorary member, a past president, and Fellow-for-life of THE AMERICAN INSTITUTE OF CHEMISTS, and he has been active in a long list of other organizations.

Lawrence Flett, however, has not only contributed greatly to the science of chemistry; more than contributed to the professional status of the chemist and the chemical engineer; gone beyond participating ably and fully in the dissemination of knowledge in his chosen field; found time for other contributions in addition to helping young people; and contributed to greater international understanding in his profession; but he has done something else which, if not more important, is perhaps more unusual!

Beyond his activities as a scientist, our Medalist has been outstanding in the recognition of the importance of the economic approach to the utilization of chemical discoveries. In some circles, it may not be popular to think of economics as a method of contributing to the growth of applied science and to the welfare of mankind. Yet

in a larger sense, it is the recognition of the virtue of the economic approach which leads to the full and efficient utilization of our scientific discoveries and inventions. Our economy differs from controlled and centralized economies in that we utilize the concept that the consumer is king.

The consumer, each individual in the community, should be free to reach his own conclusion as to the goods and services which he feels are most important to him. The consumer bids for these goods and services with his dollars. Industry, in a free enterprise economy, is geared to a competitive struggle to satisfy these needs. Success goes to those who are able to make the greatest contribution to the consumer by supplying him with more goods and services, better goods and services, or cheaper goods and services. Profits, some think, are mundane or even shameful. No concept could be more erroneous. Profits are not only the measure of success in a free enterprise economy but they are the measure of efficiency in the satisfaction of the wants of people.

Money is the only available common denominator for raw materials, equipment, plants and the human effort necessary to utilize plants and equipment to convert raw materials into the goods desired by the consumer. If we can satisfy the consumers' wants by a minimum expenditure of dollars, we are also satisfying those wants with minimum human effort; we are releasing human effort for other activities, industrial or cultural.

Profits are the measure of success in utilizing human effort efficiently to fill the needs and satisfy the desires of free men. The profits thus achieved reward the investor, provide for the security of the State and permit still further investment to supply additional goods and services, or to reduce the human effort needed to provide existing goods and services. Nothing could be more respectable than profits.

Profits in the chemical industry result from the application of the economic approach to the utilization of the findings of science. The economic approach to decisions in the chemical industry should pervade all branches of that industry. It is important in the marketing branch, as Lawrence Flett has long recognized. Moreover, it is important in all the ancillary activities of the industry. Notably, the economic approach is vital in the field of applied research, for here too we are dealing with the fundamental problem of efficient utilization of human resources to fill the needs and aspirations of mankind.

Economic analysis is not only the proper basis for decisions in a peacetime economy but in a defense or wartime economy as well, for efficient utilization of human effort, which can only be measured in terms of dollar cost, is even more important in an economy involving a struggle between competing international systems.

Our Medalist early recognized the

importance of the economic approach to the chemical industry. For example, he was a member of the book committee which supervised the publication of the only book I know in the field of successful commercial chemical development, and he was a contributor to that work. He is a member of the Commercial Chemical Development Association and has done much to promote this important field of study of the economic basis for decisions in the chemical industry.

Heretofore, I have been discussing Lawrence Flett. Now I shall discuss Mique Flett. Mique is the name by which our Medalist is known to all of his innumerable friends. It is uncertain whether the name should be spelled M-i-k-e or M-i-q-u-e. Mique says either is acceptable but the pseudo-French spelling is more prevalent. The universally applied nickname "Mique" is in itself a tribute to and an epitomization of the individual. There is something about this name which is warm, friendly and masculine. However, nicknames usually have a more specific explanation than this, so I probed more deeply and found that Mique grew up in an Irish community near Boston and learned to understand and love the Irish. Perhaps the change from M-i-k-e to M-i-q-u-e came at a later stage in his career when he came to know and love the French! In any event, Mique Flett's understanding and love for the Irish and French people is only a part of his understanding of and love for people in general.

Mique Flett has hobbies in great profusion. He is a collector of stamps and coins, and he has always had a warm spot in his heart for the young chemist who collects stamps, as it shows he knows how to handle things with care and precision, a characteristic which is useful in laboratory work!

More recently, Mique's hobbies have had to do with nature. This too is characteristic of the man. He likes to see things grow, whether it is a younger person to whose career he is contributing; a chemical plant which he has inspired, or the flowers and vegetables which he loves to cultivate. Mique shares his wife's interests in wildlife, particularly birds. He is fond of fishing and has recently found time to revive a long dormant interest in hunting. (Since his wife is a lover of wildlife, he has to be a little careful, since she might disown him if he brought home a dead deer!)

When Mique was in school, he was the tallest boy in his class and played center on the basketball team. He has difficulty in convincing his daughters of this, since the younger generation seems to be built on a different scale with respect to height. He has played sports of all kinds. He reports he is still struggling with golf.

It is obvious that Mique Flett has had not only one career but many.

How he has found time to do all the things he has is beyond comprehension. Above all else, however, stands the fact that he is a man who loves people and who puts love into concrete demonstration by many types of quiet service. Any chemist, and for that matter any individual, who has troubles can well feel free to bring them to Mique Flett. From Mique he will receive comfort, understanding, assistance, and good advice. No more can be said of any man.

Gold Medal Presentation

THE Gold Medal of THE AMERICAN INSTITUTE OF CHEMISTS was presented to Mr. Lawrence Flett, consultant, National Aniline Division, Allied Chemical Corporation, New York, N. Y., at a banquet held April 10, 1958, in the Ambassador Hotel, Los Angeles, California, during the Thirty-fifth Annual AIC Meeting. A reception in honor of Mr. Flett was held before the dinner, through the courtesy of National Aniline Division of Allied Chemical Corporation.

Dr. Henry B. Hass, retiring president of the AIC, and president of the Sugar Research Foundation, New York, N. Y., acted as toastmaster. Mr. George L. Parkhurst, vice president, Standard Oil Company of California, San Francisco, Calif., spoke for the medalist. The Gold Medal was presented by Dr. Donald B. Keyes, chairman of the Committee on Medal Award, and consultant for Arthur D. Little, Inc., New York, N. Y.

Mr. Flett's acceptance address and his introduction by Mr. Parkhurst appear on preceding pages.

The Gold Medal was presented to Mr. Flett in "affectionate recognition of his research achievments, his devotion to the profession of chemistry, and his long and unselfish promotion of the professional welfare of fellow chemists through the medium of THE AMERICAN INSTITUTE OF CHEMISTS and other societies."

About AIC Members

Dr. A. G. Hill, F.A.I.C., has been named assistant plant manager of the pharmaceuticals manufacturing department of the Bound Brook, N. J. plant, Organic Chemicals Division, American Cyanamid Co.

Dr. Eugene G. Rochow, F. A. I. C., professor of inorganic chemistry at Harvard University, has been selected to present the Annual Joseph J. Mattiello Memorial Lecture at the 36th Annual Meeting of the Federation of Paint and Varnish Production Clubs, to be held in the Cleveland Public Auditorium, Cleveland, Ohio, October 5-8, 1958.

Dr. J. T. Thurston, F.A.I.C., has been appointed technical director of the Agricultural Division, American Cyanamid Co., New York, N. Y.

Dr. William A. La Lande, Jr. F.A.I.C., vice president, Pennsalt Chemicals Corp., received the annual award of the Philadelphia chapter of Alpha Chi Sigma, national professional chemical fraternity, April 10th, for "his outstanding services to the community, the chemical industry, and the profession" as a teacher, chemist, and administrator.

R. E. Horsey, F.A.I.C., vice president in charge of sales, announces the appointment of Durkin Chemicals, Inc., Seattle 1, Washington, as sales agents for Givaudan-Delawanna, Inc., Givaudan Flavors Inc., and the Sindar Corp.

Dr. James L. Jezl, F.A.I.C., has been appointed section chief of the applied Research Section of Sun Oil Company, Research and Development Division, Marcus Hook, Pa.

Dr. Austin W. Fisher, Jr., F.A.I.C., has been named manager of business development for the Research & Development Division of Arthur D. Little, Inc., Cambridge 42, Mass.

Dr. W. R. Smith, F.A.I.C., has been appointed associate technical director of Godfrey L. Cabot, Inc., Boston 10, Mass.

Dr. Foster D. Snell, F.A.I.C., of of The American Chemical Society. Foster D. Snell, Inc., New York, N. Y., is general chairman of the short course on soaps and syndets to be given by the American Oil Chemists' Society at Princeton Inn, Princeton, N. J., July 14-18, 1958.

(*Continued on page* 306)

Presidential Address

Dr. Henry B. Hass, F.A.I.C.
Retiring President, The American Institute of Chemists

(Presented at the Institute Luncheon, held April 11, 1958, during the 35th Annual AIC Meeting in Los Angeles, Calif.)

IN his scholarly treatise, "A Study of History", Arnold J. Toynbee addresses himself to the question of the causes of the rise and fall of civilizations. He points out that there is no obvious regularity to these phenomena; some nations flower and die quickly; others persist for thousands of years. He proposes the hypothesis that persistence means successfully meeting and surmounting a series of challenges. When a nation is confronted with a challenge too great for its capacity, or when it fails to rouse itself and marshall its forces to the degree necessitated by circumstances, it is defeated and may decline to the point where the torch of human progress is carried by some other nation or group of nations.

I shall use this hypothesis in the critical examination of some facets of current American history. As a scientist I shall confine attention to the scientific aspects of the problem of our national survival. The justification for this limited treatment is that the events of the past two decades have shown that excellence in scientific research and development is a *sine qua non* for success in either peace or war.

The American people have become deeply disturbed by the realization that we are not doing well in the scientific race with Russia.

The basic reason why progress is not more rapid in this country is that we have allowed our educational system to degenerate. The low salaries paid teachers are a national scandal. They have resulted in the loss from the teaching profession of many of its most brilliant minds. Even worse, they have contributed to a lack of respect for the devoted, self-sacrificing idealists who have continued to staff our schools. The Mayor of New York (the richest city in the world) has just reported that no increase in teachers' salaries is possible this year. President Eisenhower's request for Federal funds is expected to encounter the toughest kind of opposition in Congress. The average salary for college and university teachers is $6,120. per year. Enrollment in teachers' colleges have dropped to the point where it is freely predicted that none will be left in existence in this country within one or two decades.

To many who are familiar with teachers' colleges, this prediction can only be welcomed. They have, on the average, attracted the less able students who have been subjected to a dreary round of repetitious courses in

education with a minimal attention directed to understanding the subject matter of the material which will later be taught. The theory that a person really does not have to know much about what he is teaching if he has had enough courses in methods may, in some cases, be true! I had a high school physics teacher who knew so little physics that some of us studied pretty hard to be able to point out his mistakes. By and large, the theory of the relative unimportance of teacher ignorance has played havoc with our secondary schools.

This does not mean that this theory is dead! Far from it! THE AMERICAN INSTITUTE OF CHEMISTS, and the Engineering Council, is presently engaged in an attempt to prevent still further encroachment on subject matter courses by so-called education courses in the State of New York. In spite of the current sputnik psychology, it is by no means certain that we shall succeed.

Allied with low teaching standards is the concept that everyone has to "succeed" in school. "Succeed" does not mean that the student must learn anything of importance, or that he shall have acquired a love of learning, or the self-discipline necessary for true scholastic achievement. It means rather that he is passed on to a higher grade almost regardless of achievement.

Any realistic person with a knowledge of youngsters will grant that many of them do not have the mental endowment required to profit from rigorous training in science and mathematics. The Maxwell distribution law applies to intelligence as it does to the kinetic energy of gases. Any sane educational system must learn to deal constructively with pupils whose intelligence is below average. Many such young men are weak in the verbal facility factor, but intelligent in manual operations. In the face of a crying need for repairmen and mechanics, necessitated by our present gadgetry, we have signally failed to make adequate use of the potential of these youngsters. As a result, many scientists and engineers who should be doing more important things are performing operations suited to people with lesser training. It does not do a scientist any harm to grab a Stillson wrench and do his own pipe fitting! But it does slow down the progress of science at a time when we can not afford anything but full speed ahead. The frequent complaint that highly trained people are not being utilized to maximum capacity emphasizes the failure of our educational system to turn out an adequate supply of technicians.

The principle of equal pay for equal rank and experience, regardless of skill, effectiveness, or subject matter field, is another source of weakness in our educational system. The competition of industry for scientists and, more recently, for mathematicians, has

drained a high proportion of the abler men and women away from education. In many fields of teaching such competition does not exist. To treat a physics teacher and e.g. a teacher of baton twirling with exactly the same salary policy represents utterly unrealistic disregard of the law of supply and demand. We can not afford such stupidity under present conditions.

Some Chapters of the INSTITUTE have engaged in an active effort to help this problem by locating summer employment for high school chemistry teachers in chemical industries. These chemists substitute for regular employees who are on vacation. The experiment has been a resounding success. The teacher acquires added status with his students by escaping the stigma of Shaw's old bromide, "Those who can, do; those who can not, teach", to which a professor once added, "Those who can not teach become deans".

The familiarity with chemistry as it is actually practiced is almost certain to make the science more interesting to the teacher. If we had enough high school teachers interested in chemistry, to the point of being excited about its great challenge to the individual, its present contribution to our civilization, and its magnificent promise for the future, the shortage of chemists would disappear. Industry acquires conscientious employees who are strongly motivated to do their new jobs well. It gets us through the awkward summer months when we have always been shorthanded because of vacation schedules. Here is something concrete that every Chapter could do to advance the profession.

Another source of weakness in America is our relative neglect of the training of women in science, and particularly in engineering. Policies suitable to the Russian way of life should not be thoughtlessly adopted by us; they might not prove appropriate to our conditions, but it is worth noting that half of the Russian scientists, and 20% of engineers, are women. We can ill afford to let obsolete prejudices discourage capable women from entering our profession.

In their great book, *The Next Hundred Years,* Brown, Bonner, and Weir point out that in the development of our civilization for the past 150 years the proportion of scientists and engineers has multiplied itself by about a factor of ten every fifty years. Approximately one more such increase in order of magnitude is possible if we are able to (1) attract women into the scientific professions, (2) send all the bright youngsters to college instead of half of them, and (3) learn to motivate the lazy students so that the attrition of preventable failure is eliminated. We shall also probably learn to make greater use of the potential of negro young people. These three doublings would give only an eight-fold increase, but the difference between this and ten could easily be

made up by robbing some of the occupations of lesser social usefulness. Personally, I would start with astrologers, numerologists, and pseudonutritionists who couldn't pass an examination in Freshman chemistry!

The relative weakness of science, to what it could be, in America, can not be blamed entirely upon our educational system. Our policies with respect to compulsory military service must bear their share of the responsibility. In Russia, a student has a strong incentive to perform creditably in the university; if he neglects his studies he goes into the Army. In America, he may go into the Army anyhow, and spend his time in part picking up cigarette butts and on kitchen police duty. This does not hurt the budding scientist particularly—it helps prepare him for married life—but it does slow up the progress of science at a time when our rate of scientific progress is likely to be the dominant factor in whether our way of life or that of the Russians will predominate. This has been explained over and over again to those in charge of our selective service policies. Present policies are not due to lack of comprehension of the problem; they are due to politics as usual, and disregard of the national interest!

Still another source of scientific weakness is attributable to a phase of American life which has come to be called McCarthyism, and which includes the hounding out of key positions of some of our ablest scientists. I illustrate this by quoting from a past president of the American Association for the Advancement of Science, Dr. Edward U. Condon.

> "During the last two months there has come about a general public awareness that America is not automatically, and effortlessly, and unquestionably the leader of the world in science and technology. This comes as no surprise to those who have watched and tried to warn against the steady deterioration in the teaching of science and mathematics in the schools for the past quarter century. It comes as no surprise to those who have known of dozens of cases of scientists who have been hounded out of jobs by silly disloyalty charges, and kept out of all professional employment by widespread blacklisting practices. It comes as no surprise to those of us who have known how good American scientists have had to face vilification by political speechmakers in and out of Congress, and have been falsely prosecuted for perjury, and have been improperly denied passports, or have had their passports seized and invalidated without due process by the State Department, or who have had their telephones tapped or their letters intercepted by government agents. . . .
>
> "I do not wish to seem boastful, and in this respect I would gladly change places with any of you, but I think that I have probably had a bigger dose of this kind of mistreatment than any of my fellow members of the American Physical Society." . . .

There is another deplorable aspect of the situation. When scientists use their prestige as professional people and, presumably, clear thinkers, to echo the communist party line with respect to such matters as the suspension of nuclear test explosions they are exercising their fundamental right to make fools of themselves. Everyone

in a democracy has that right and I hope that we always will have it. But we might pause before we naively help out Mr. Khrushchev's propaganda machine and consider what effect it will have on the attitude of the public toward our profession. When Dr. Teller recently pointed out that all of the radioactive fallout so far would probably shorten our life expectancy by a matter of two days, the same amount as if we were one ounce overweight or smoked one cigarette every two months, he put the matter in proper perspective. He also made 9,000 scientists look pretty foolish. If we want public respect and recognition we must first deserve it.

The crucial ills which adversely affect American science lie in the lack of public awareness of the vital role of science in modern affairs and of the conditions necessary for maximum scientific fruitfulness. *Faust* is still one of our favorite operas, and the feeling that the scientist is in league with the devil is far from dead. Scientists are responsible for atomic bombs, poison gases, germ warfare, and other troublesome things, and maybe it would be better if the rate of research progress were slowed a bit until the social sciences could catch up. Fortunately or unfortunately, our adversary has no such attitudes except in genetics where the facts of science run counter to the tenets of dialectical materialism.

In a democracy, public support of the policies which would strengthen science can never run far ahead of public understanding. The American public has a vast respect for science, it wants to understand the scientist, but until recently we have given our nonscientific friends precious little opportunity to do so.

The idea that a scientific society has discharged its duties to its members and to the public when it publishes the appropriate scientific journals is one which THE AMERICAN INSTITUTE OF CHEMISTS has never shared. It is a logical extension of the policies of this organization, that at the request of Ray Dinsmore, I appointed the Committee on Implementing Objectives of the Institute, under the Chairmanship of Lloyd Hall.

To understand the activities of this committee, it is necessary to bear in mind what our objectives are. (These will be found on page 127 of the April 1958 issue of THE CHEMIST.) The Committee has recognized the importance of Objective No. 9, "the education of the public to a better appreciation of the contribution of the Chemist and Chemical Engineer to world progress", and specific recommendations have been made.

As the American public becomes more sophisticated about science, it may learn to tell the difference between such advocates of fluoridation of public water supplies as the U. S. Public Health Service, the American Dental Association, and the American Medical Association on the one hand,

and the earnest, misguided people who oppose them. We may become less gullible about the misuse of science in advertising. We may even come, ultimately to recognize science for what it is: the great benefactor of man, the liberator of his mind, the well-spring of human progress and an essential element in our national survival.

Dr. James E. Magoffin, F.A.I.C., was elected vice president of Eastman Chemical Products, Inc., Kingsport, Tennessee. He was formerly sales manager.

Guy A. Kirton, F.A.I.C., has been promoted to sales manager of Eastman Chemical Products, Inc., Kingsport, Tennessee.

Dr. Paul D. V. Manning, Hon. AIC, has been appointed professor of chemical engineering at the California Institute of Technology, Pasadena, Calif. He retires on June 30 from his position as senior technical vice president, International Minerals & Chemical Corp., Chicago, after 17 years of service.

Emmett S. Carmichael, F.A.I.C., chairman of the teacher's award jury of the American Chemical Society, announces that Abram N. Kerner, chemistry teacher, Stuyvesant High School, N. Y. C., has won the first annual $1000 Nichols Foundation Chemistry Teacher's Award.

Dr. William H. Armistead, F.A.I.C., vice president and director of research and development of Corning Glass Works, announces that Howard R. Lillie has been named to the newly created position of staff research manager.

Dr. Robert S. Aries, F.A.I.C., consulting engineer of Stamford, Conn., reported, after his return from Europe in January, that the use of solid electrolyte capacitors is increasing sharply throughout the world.

Daniel H. Terry, F.A.I.C., has joined Boyle-Midway, Division of American Home Products Corp., New York 16, N. Y., as assistant to the director of research.

Frank C. Byrnes, F.A.I.C., is now vice president of Mid-West Laboratories, Inc., 1952 W. Irving Park Rd., Chicago 13, Ill.

(*Continued on page* 314)

The Chemist in Logistics

Dr. A. Stuart Hunter, F.A.I.C.
Scientific Director, HQ QM R & E Command, Natick, Mass.

(Condensation of a paper presented at the 35th Annual AIC Meeting, April 10, 1958, in Los Angeles, Calif.)

THE story of the place of the chemist in military logistics will not attract the attention given to Sputniks or the Explorer. It is more closely related to the unsung efforts which have been going on throughout the life of this nation in behind-the-scenes effort to enable soldiers to operate with a maximum of material support and comfort, and a minimum expense to the taxpayer.

It is through the analytical and professional opinions of the chemist and his associates that functional behaviors of materials to be used are ascertained. These facts make up the essential ingredients of military purchase specifications, which attempt to insure that a "low bidder" delivers to the Department of Defense the functional performance demonstrated in development prototypes as essential to military welfare.

Down through the years, logistic efforts have generally taken place as a part of a Quartermaster activity. The first piece of legislation relating to Army supplies was enacted in Carpenter's Hall, Philadelphia, June 16, 1775:

> **Resolved, that there be one Quartermaster General for the Grand Army, and one deputy under him for the separate army. That the pay of the Quartermaster General be $80 per month, and that of the deputy $40 per month.**

A resolution passed December 22, 1775, conferred upon the Quartermaster General the rank of Colonel. In 1776 Congress granted the Quartermaster General the privilege of appointing two assistants acceptable to himself. It appears that the Quartermaster's Department furnished all supplies for the Army save clothing, which was in charge of a Clothier General, first appointed in December, 1776.

A decrease in the army after 1781 reduced the work of the department materially, so Congress, to reduce expenses and conserve public funds, resolved, July 25, 1785, that the department of Quartermaster General be considered as ceasing on that date . . .

There followed a period in which there was no organization or effective force in the Quartermaster's Department. Note the chronic interest in Congress of conserving public funds way back in 1785, and realize how interest in logistics waned thereafter, only to arise again as a crash program every time the country found itself in military trouble.

Today the concept of military logistics has expanded. The official definition reads:

> **In its most comprehensive sense, logistics is those aspects of military operations which deal with (1) design and development, acquisition,**

> storage, movement, distribution, maintenance, evacuation and disposition of materiel; (2) movement, evacuation and hospitalization of personnel; (3) acquisition or construction, maintenance, operation and disposition of facilities; and (4) acquisition or furnishing of services. It comprises both planning, including determination of requirements, and implementation. (AR 32-1 dated May 1955)

This paper will consider development phases and procurement actions wherein the chemist plays a dominant role. Particular reference will be made to practices in the Army which image the similar use of chemists in the Navy and Air Force.

All logistic actions stems from the development or acquisition of materiel. Processes by which R&D projects come into being are dominated by AR 705-5 dated 28 Dec. 1955. It establishes a pattern of interlocking actions and responsibilities for Research and Development, testing, classification, and modification of materiel. All technical proceedings hinge on a military requirement—a recognized and approved need for the new item. The next step is the establishment of military characteristics which broadly state those qualities of the item or materiel. Once approved as necessary by CONARC, the Continental Army Command, an assignment for development is given to the Technical Service having an applicable mission or demonstrated capabilities.

Chemists or other scientists of the service (Quartermaster, Ordnance, Signal) prepare technical characteristics setting forth the probable cost, and the engineering and functional attributes which can be attained within the prescribed time frame.

Once a project has been approved by a technical committee, composed of technical representatives of the interested services and those from CONARC and the Department of Army, the project is in being, and it serves as a basis for budgetary action and subsequent technical performance. Projects for research, studies, services, etc. are established by technical committee action in a similar manner.

While recommended military requirements may be initiated by any unit or individual in the army, CONARC decides whether an item is actually needed and will be accepted for field usage, and will ultimately conduct tests on any completed item which the chemist and his associates have developed, tested, and offered for user-testing as meeting the published technical requirements.

Items in use by the army are classified as standard, limited standard, or obsolete. Here again the chemist technically determines in what category an item should be considered and whether changes should be made based on industrial potentials or the availability of superior materials . . .

There are some 3½ million items of supply catalogued in the Department of Defense Supply System. The

magnitude of the logistic problem, the responsibilities placed on the military chemists, and the mandatory difficulties under which they operate, sometimes greatly exceed those of their civilian counterparts, who often are paid much more for accepting the same degree of responsibility.

Possibly 5000 of the items of supply are purely chemical. Yet, since the chemist is concerned with the evaluation and approval of materials to be used, he has a sweeping interest in most end items, including some 25,000 directly classified as military weapons.

Of $3.3 billion in the FY 58 government R&D budget, $2.1 billion was allocated to the Department of Defense. It is not possible to know just what fraction of these funds is being used beyond basic and applied research and directed toward specific design and development.

Many things the chemist does relate to applications engineering (the determination of manufacturing capabilities, trial orders, and their evaluation) and standardization, which are separately financed. In any event, these funds are being used to advance the country's degree of offensive-defensive capabilities, and to protect the procurement investment of supplies and equipment which in 1957 amounted to over $20-billion.

The National Science Foundation indicates that the Department of Defense employs some 4500 chemists.

But this figure is far too small to represent the total employment of people with various levels of chemical training who use chemical knowledge in their daily work. (Part of this is due to the unique confusion associated with Civil Service classification titles). There is no way to know that a scientific administrator is a graduate chemist, yet many are.

Furthermore, in modern science and technology it is not possible to differentiate between disciplines except in the simplest cases. Progress is being made in the larger problems through coordinated team effort and in the Army "coordination" is the "key" word, the thread that holds the vast operation together.

The chemist is vitally concerned in evaluating materials and classifying them as to their potential military usage, whether they be chemicals, ceramics, drugs, foods, fungicides, fuel, insecticides, leather, metals, paper, plastics, rodenticides, rubber, textiles, or mixtures thereof.

During war, when the availability of things manufactured in accord-

ance with official specifications becomes doubtful, and logistics as a whole start to wobble, the chemist comes in for an increasing service. Many times it is up to him to say what can be used as substitute material and at how much of a sacrifice in military importance. Everybody is looking for the scarce material and trying to demonstrate that it is essential for use in the item of his particular concern. So the chemist gets out his notebook to find what almost made the grade when he first determined what the item was to be made of and how. Based on these accumulated experiences, and his knowledge of material improvements and market availability, he can determine what can be used instead of the wanted, now critical, material. Thus the tendency is to go from more critical to less critical materials; from metals to wood or plastics; from cloth to paper, etc. It is important to note that there may be no time to make studied choices, but under the pressure of limited supply and urgent demand, the chemists must draw on their accumulated experience of military needs and make professional decisions, on which the actual success of military campaigns may depend. This is an example of the value of the scientific arm of the Department of Defense.

The tempo of research for new materials is increasing. We have pretty well used up the technology of known materials, and until those with new properties are found, no great breakthroughs in many areas of military performance are possible. The attainment of new temperature resistant metals and alloys has lifted jet plane performance by the "boot straps", and the end is not yet in sight. The successful research for materials which made the industrial potentials of atomic energy come into being was a major breakthrough.

The need for weight reduction essential to aerial delivery requirements to make possible concepts of mobility in military tactics and logistics is pressing another type of material research, as the conversion of heavy canvas tents perhaps to those made of chemically treated light-weight fabrics or paper, which may be expendable or more portable. Here the chemist must be sure of the compatibility and durability of materials under all military exposure conditions—weather, insects, radiation contamination. All field equipment must be able to stand up under a range of exposure conditions far in excess of what civilian economy or durability needs or expects.

The chemist and other scientists by their decisions and measurements must prescribe the ways of demonstrating, for example, that coating materials do not break away from fabric surfaces during wind storms in freezing weather, or that elastic polymers do not undergo permanent set under arc-

tic storage or standing conditions, or lose their elasticity, Two-dollar fuel pipes which shatter when impacted at 40° below zero during high flight could cause the destruction of crew, cargo, and a million dollar plane.

Dominating the picture of the acquisition-procurement of materiel, is the preparation and coordination of specifications. Here many people with a chemical background are employed. The job has two aspects, the establishment of an original specification or purchase order to make it possible to purchase a newly developed item, and the continuous review of the 20,000 specifications in use, to be sure that each document is up-to-date and that it clearly reflects the best an average industry can do. The Department of Defense is making a serious attempt to reduce to a minimum the number of specifications in use by the three services, through coordination committees of chemists and others.

The chemist in this standardization area requires a knowledge of manufacturing limitations and capabilities, as well as common sense. He may get the assistance of industry through an Industry Advisory Committee to review "drafts" of a proposed specification, to assure that the requirements are understandable and can be met by the average industrial producer.

Finally there is the chemist who forms the backbone of the procurement laboratories throughout the country. To these laboratories the

contractors send samples of goods being manufactured to check their quality. These control laboratories are at the service of the military inspectors and enable them to accept or reject goods for which they are responsible.

The outstanding characteristics of military procurement are that they are (1) based on the evidence of function, (2) prescribed and delimited in a written specification, (3) dependent upon the manufacturing performance of the low bidder.

Industry can establish a policy of repeat purchases from companies on the basis of past experience, and can set its own requirements as to the selection of companies. The military chemist has no such freedom and cannot specify a design which might be the optimum, because he at all times must pull back from what might be the best answer to select one within the capabilities of the average manufacturer and presumably the low bidder. This is a matter of law; too often, whatever decision the chemist makes, he is subject to harassment by the man who did not receive the bid, sometimes strangely bolstered by Congressional interest. Often a manufacturer will contest the basis on

which a military specification was prepared, so that the chemist must always be in a position to justify his decisions.

There is another difference in military items which the chemist or designer must remember. In commercial life, each industry prides itself, and often develops business on, a unique difference which its item posseses, and for which a point can be competitively made that it is beneficial to the consumer. Thus the array of items which industries can offer the Department of Defense is large, and never constant, since new models are the way of life and the foundation of business. In contrast, the military designer must recognize the problem of keeping the number of supply items to a minimum, to make them simple and rugged, possessing the maximum interchangeability of parts, and producible by as many manufacturers as possible.

The spare parts problem in military situations has been of terrific importance in that, in the massive confusion of logistics led astray, sometimes spare parts were in the wrong location at the wrong time. Today, to be compatible with the requirement for mobility and minimum weight, constant checking is being done to insist on simplicity of design and operation, and the utilization of standard interchangeable parts.

In the case of food, the special demands of military procurement are again evident. The dominating factor in research and development is that the results of the efforts of the biochemist, food technologist, etc., shall be such that the food is wholesome and acceptable at the time of use, not only at the time of manufacture.

Unfortunately for the military, there can be no such thing as guaranteed controlled storage temperatures, particularly under combat conditions. The great quantities of food which must be held in reserve in various parts of the country must be ready to meet any sudden demand or mobilization requirement. As an objective, it is expected that the food can be stored for at least three years. The chemist is busy trying to forecast storage life. Steps are taken to rotate food stocks so as to minimize the problem of maintaining an acceptance in food in spite of long, and sometimes uncontrolled, storage temperature conditions. The desirable storage life has not been attained in many foods. Industry would never think of demanding or delivering such a storage guarantee. Many food industries operate on the expectancy of a rapid supply-consumption cycle.

Military chemists have developed many new foods which are on the market today. Some have been developed to the point of having a storage life satisfactory for commercial utilization, but not sufficient to allow the item to be accepted for entry into the military supply line. The responsibility of the chemist in determining a

reasonable yet assured storage life is a serious one . . .

The Office of the Surgeon General has a mandatory responsibility of prescribing the total quantity of nutritional ingredients that the combat man has to receive each day. For the Army, it is the responsibility of the Quartermaster General and his Food and Container Institute chemists to evolve the food components which constitute meals, so that in each daily ration is the total of the nutritional assets demanded by the Office of the Surgeon General.

Obviously, it is difficult for the chemist to ascertain what the foods shall be to comply with the fluctuating variables in the degree of the activity of the men and the environmental exposure—cold, heat, or moisture. Thus, the food technologist, having ascertained that the foods function as required, must be sure they are so packaged that the original values are not lost by the ingress of air, moisture, insects, or contaminants.

The problem given to the food chemist must be solved if logistical support in the field is to be possible. Gone will be the organization of cooks, bakers, and food preparation people, because one cannot depend on the availability of ground transferred equipment. The new combat meals must be something each man can handle himself with little or no equipment, and thus the chemist's renewed emphasis on dehydrated foods or irradiated foods to offset the expected lack of refrigeration and mass feeding facilities. Chemists have already made great improvements in dehydrated foods. Nine dehydrated food items are in the military supply line and are being served to troops throughout the world, as named ingredients in the master menus. A new mobility objective is to provide a series of meals based on precooked dehydrated foods properly packaged, so that all the soldier has to do is to add hot water . . .

Things yet to be answered by the food chemist include the unique problem of "How do you feed men in space ships?" It has always been true that men travel on their stomachs. Tomorrow they must as well fly on their stomachs. Here the problems are as yet undefined . . . weight and space will be at a premium never before considered . . .

The responsibility placed on the military chemist and his associates is high indeed. In industry one can check the success of the chemist by how well his products sell, and replacements can be made if indicated. With battle materiel, the only proof of success is the ability to win. Things must be right—the chance to make corrections may never come.

Nopco Chemical Company, Harrison, N. J., announces that its Richmond, Calif., plant is now "on-stream" with a complete line of wax sizes.

Dr. Foster D. Snell, F.A.I.C., announces that Foster D. Snell, Inc., New York 11, N. Y., has acquired the consulting firm of Davis & Bennett, Inc., of Worcester, Mass., which will be known as the Davis & Bennett Division.

Robert A. Pollock, F.A.I.C., has been elected vice president in charge of production and development for George Degen & Co., Inc., 111 Broadway, New York, N. Y.

Savery F. Coneybear, F.A.I.C., is now the director of New Products Development for Colgate-Palmolive Co., 300 Park Ave., New York 22, N. Y.

Dr. Wolfgang Huber, F.A.I.C., has been appointed West Coast representative of Food and Drug Research Laboratories, Inc. His office is at 1079 Lombard St., San Francisco, Calif.

Asher J. Margolis, F.A.I.C., was recently promoted to manager of the Pilot Plant of Simoniz Co., Chicago 16, Ill.

James J. Doheny, F. A. I. C., is visiting Germany to staff the joint American Chemical Society-National Chemical Exposition booth at the ACHEMA. He will visit Russia and Scandinavia after the show.

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The International Chemist

William Q. Hull

Associate Editor, A.C.S. Applied Journals, 2 Park Ave., New York, N. Y.

(A condensation of a paper presented by Dr. Walter J. Murphy, Hon. AIC, before the 35th Annual Meeting of the AIC, April 10, 1958, Los Angeles, Calif.)

THERE is actually no such being as an "International chemist!" In comparing the chemist in different parts of the world — his work, professional status, standing in the community, and the respect for his accomplishments — we must consider the economic, political, and geographical conditions in each area. When this is done historically, we understand why, though chemistry itself is without boundaries, the chemist achieves a varying degree of recognition in different countries.

The emphasis placed on science as a product of these conditions determines its role in the educational program. In the U.S., only lately has it been realized that it is eminently desirable that tomorrow's voters possess some understanding of science. High school science has received little attention, resulting in fewer students who major in science. There has been far greater emphasis on science in other countries.

In Europe in the late 19th century, there was a booming population which had limited natural resources. It feared eventual starvation. Two forces were at work. One sought to create colonies to get needed raw materials. The other tried to accomplish the same thing through science. One event more than any other stirred the scientific incentive. When Fritz Haber, in 1905, invented the system whereby, under pressure, a nitrogen-hydrogen mixture is circulated continuously and ammonia is extracted, he provided the stimulus which led to many developments that permitted countries to utilize existing resources. Later, as director of the Kaiser Wilhelm Institute for Physical Chemistry, Haber's work helped in the production of explosives for World War I. Germany developed a chemical industry second to none, because the German government knew that the ability to wage war was closely tied to industrial ability. Before World War I, Germany led in the production of organics, exporting some 60%, sometimes at a price less than in her domestic market.

The U.S. entered World War I with a satisfactory inorganic chemical industry, but a totally inadequate organic industry. If a process seemed "uneconomical", we imported the product. But we learned a lesson from World War I. After that, when Germany attempted to dump goods here to kill off our infant organic industry, our government finally realized that a well-diversified chemical industry is essential in peace or

war. By World War II, we were practically self-sufficient by way of chemicals. Exceptions were synthetic rubber and synthetic fuels. We had not believed that we could be cut off from the sources of natural rubber, so when Japan conquered much of the Far East, we had to build, almost from scratch, a synthetic rubber industry. Fortunately, a few, far-sighted persons had insisted, in 1940, that we should have a few small pilot plants in order to understand synthetic rubber techniques. Our fuel shortage was not sufficient to force us into synthetic fuel production. Since then, our government has conducted extensive studies on fuel from oil shale deposits, so that if needed, we could tap our huge oil shale resource.

One reason the German industry developed so rapidly was because it advanced chemists and engineers to top managerial posts long before we began to do so. In the U.S., until recently, bankers, lawyers, and salesmen held all the key positions. As chemical industry became more intricate, the non-technical man had trouble understanding it. Now, we have many technically trained company officials.

Until our recent awakening, we requested funds for basic research through the "back door" approach, by showing that we could expect something definite. But in Germany and other countries, there has been no hesitation whatsoever to ask for money solely for fundamental research. Consequently, through the close exchange among government, industry, and universities, basic research abroad has excelled.

How does the training of the chemist here compare with that of the chemist in Europe and the Soviet Union? The Board of Directors of the American Chemical Society summed up the situation in 1956, in its statement of policy on matters relating to education:

> The United States can be proud of its education heritage. In accordance with democratic principles, it has placed educational opportunities before all its citizens, a situation that exists in few other countries of the world. Paradoxically, this sound basic philosophy and the general availability of facilities are not meeting the educational requirements of our nation . . . as the privilege of formal education has been extended to an increasing number of people, appreciation of the value of and need for a disciplined and rigorous education has decreased. Many who now crowd our school rooms are capable of absorbing better training. They do not do so because of lack of motivation or lack of opportunity . . . In the past several years, there has been a sharp decline in the number of scientists and engineers graduating from our colleges and universities . . . at a time when demand for persons so educated to meet the needs of national defense and an expanding civilian economy greatly exceeds past requirements and promises to rise still higher. The situation imperils the prosperity and security of the United States because both depend on unceasing advances in science and technology."

The statement goes on to show:

(1) There is a nation-wide shortage of qualified high school teachers.
(2) The proportion of new teachers of science has been declining more rapidly than in other fields of specialization.
(3) Only about one student in 11 enrolled in high school elects chemistry; approximately 1 in 16 elects physics, and the proportion who elects mathematics courses has been on a decline for nearly a half-century.

In Russia, elementary and secondary schooling continues for 10 years. But school days are longer, with a 6-day week, and vacations are shorter. Homework is heavy. Report cards are graded almost daily and parents must sign them each week. At the end of the fourth grade, each student is given a standard national examination. To fail in a single subject means that the student must repeat the whole grade. After the seventh grade, evaluation occurs. The student must pass an oral quiz by a three-man panel, including his teacher and his principal. He then progresses to the regular three-year secondary school, similar to our high school, which completes the 10-year Soviet System. If qualified, he then goes to advanced study. In contrast to our own program, the emphasis is on science during the ten-year period, with 40% of the courses devoted to science. Every graduate of the 10-year program gets five times the science requirements for entrance to M.I.T. — five years of physics, four years of chemistry, and mathematics through differential calculus.

In Europe, where science is emphasized more than in this country, the chemist's training compares favorably with our own. But the competition for college is keener; only one is chosen from every 10 to 20 applicants, and the average calibre of the student is higher. However, if one limits comparison to the senior class, it may be about even, because we do the weeding out between the first and fourth year of college.

We may wonder about the possible neurotic and psychotic result of the Russian educational program. Former Senator William Benton, who studied the Russian education system, says there is some erosion from the heavily slanted science training. But, he adds, we have some erosion from our own less rigorous, more academic, approach — erosion from juvenile delinquency.

Thought should be given to certain aspects of our system: Should more students be required to study chemistry and physics, even if they do not plan scientific careers? Should

more students be exposed to chemistry before college? Should we lengthen the school year, historically a 9-month period to permit harvesting of crops, when in many areas, half-day sessions are held because of crowded conditions? Should a teacher have more liberty in not passing or upgrading poor or superior students? Should we reconsider the 16-year minimum age for leaving school?

Let us look at the degree of respect which the chemist receives. Generally, as the standard of living improves in a country, scientists are more highly respected, though there are exceptions. In Germany, where nearly everyone studies chemistry, the chemist is regarded with understanding reverence, and science is practically a religion. Certainly the continental chemist is regarded with more respect than in our country. Paradoxically, in Russia, where the standard of living is low, the scientist has top public esteem. But the top chemist abroad gets respect because he demands it. Just about everything he does requires that he get it. We talk about wanting more respect, but in too many instances our personal action does not command it. Many in our field do everything to discourage it.

While the chemist abroad enjoys greater respect, in many European countries it is only the senior scientists who get credit for accomplishments. It is gratifying that in the U.S., the senior author, reporter, or speaker, takes extreme care to emphasize the credit to his colleagues. On several occasions abroad, I saw a distinguished chemist from the U.S. begin a lecture by listing colleagues who should get partial credit for the work. I do not recall any European going to this trouble.

In this country, we try to get the young chemist interested in our professional societies while he is yet a student. (The ACS has 323 student affiliate chapters.) Scientific meetings abroad are often composed of middle-age or elderly groups. Many appear to be strictly social clubs, and little effort is made to recruit younger members.

It is quite interesting that outstanding people abroad get top respect, although there is no counterpart of the ACS News Service, which acquaints the American public with the work of chemists and chemical engineers. There is nothing in the way of publicity or public relations for any of the scientific disciplines, as we have here. Nor is there an over-all society similar to the ACS, the "big umbrella" under which chemists and chemical engineers can affiliate together for mutual advancement. The specialized professional groups in Europe are necessarily small in size and in financial resources. This has its effect on the translation and dissemination of scientific information. The small specialized societies publish the journals, which

are consequently high-priced when compared to ours.

The age problem provided an interesting experience in 1951, when the ACS Diamond Jubilee and the 12th International Union of Pure and Applied Chemistry convened in New York. Arrangements were made for a number of foreign chemists, under thirty-five years old, to come over for these meetings. We met strong opposition from European chemists, who expressed disapproval of the age limit, forcefully stating that it should have been 45 or older. They asked why these young men, whose contributions had been few, should be invited at all. In contrast, in this country, the AIC, the ACS, and our sister societies, all strive to see that the accomplishments of young chemists receive every recognition. We believe that the most productive years of a chemist start at a lower age level.

Research and technology abroad have greatly affected the growth of our own industry. Before the War, the basic work came from European laboratories and was developed to a commercial stage in the U.S. Now the situation is changing, and European companies are often the first to be in commercial production of new chemical products, even though U.S. companies are racing to make the goal. Typical of the earlier day is Dacron (called Terylene in Great Britain), which resulted from research in Imperial Chemical Industries Laboratories. Before commercial production was achieved in Great Britain, American licensees had built plants, started production, and our consumer items were being sold in England. A significant example of the present situation is a low-pressure polyethylene, developed by Prof. Karl Ziegler at the Max Planck Institute for Coal Research at Munheim. The first commercial production was by Farwerke Hoechst, Frankfurt, even though licensees in this country were making every effort to get plants operating.

Can we still look to European scientists for basic knowledge? Our National Science Foundation says that the U.S. can no longer depend upon importing basic discoveries for industrial progress. Rather, we must greatly increase efforts to provide

more favorable conditions in our own universities to foster fundamental research and to train scientists.

It still seems, however, that the average European chemist is more creative; gets more original ideas, and follows them more doggedly, even in extra hours beyond normal working time. He is a more avid technical reader; spends less time at TV and outside interests. But if the process discovered is a difficult one to adopt for large scale manufacturing, American chemical engineers might still outshine the European counterpart, particularly in the petroleum field where the American chemical engineer, with his background in petroleum technology, is at a distinct advantage.

The typical continental chemist is more introspective, another way of saying that he has a different, more fundamental approach, and therefore excels at research. This theory is used by a number of American firms to justify the establishment in Europe of modest, fundamental research laboratories. There is more team work abroad, as contrasted to the U.S. While we have gone in this direction recently, a large number of our chemists have preferred to work alone. We must remember that, abroad, the man with the B.S. or M.S. degree is generally thought of as a technician, not as a graduate chemist.

Here are two examples of what one can run into in counting too heavily on foreign scientific sources. A company decided to engage a European professor, an expert in his field, as a consultant. The contract included a typical clause that he would not serve as consultant to competitive companies during the contract period. When the contract was presented to the professor, he scanned it quickly, agreed to the financial terms, and then said he need not take time in reading it, "If it meets the company's approval, it meets mine." The company's representative insisted that he read every word, underscoring the clause pertaining to competitors. The professor then realized that the representative knew he was already consultant to two other American companies in the identical field. The contract was withdrawn. Certainly all foreign scientists would not become so involved, but it can happen.

Recently, an American visitor abroad saw a letter which had been sent to all universities in a country friendly to the U.S. The letter specified two requirements for schools to qualify for government grants for

chemistry. First, no professor could serve as chemical consultant to U.S. companies. Second, the schools could not have graduate students in chemistry from the U.S. With such conditions existing, there are uncertainties in counting heavily on foreign sources for our research needs.

Let us consider some trends bearing on our profession. The Russian sputniks, more than any single event, resulted in a reappraisal of our educational systems, scientific accomplishments, and the importance of our scientists. More public attention has been given to science in the past six months than in a decade before. The President has appointed one of our outstanding chemists as a special scientific advisor to the State Department. In this capacity, Dr. Brode will re-establish scientific attaches in several of our embassies abroad, a recommendation that previously fell on deaf ears.

Our teachers have been spotlighted. But salaries are still shamefully low in the light of the crucial importance of education. A Department of Health, Education and Welfare report shows that the average 1958 salary for college faculty members is $6120. There was a 20% increase in average faculty salaries from 1947 to 1954, and a further 20% increase since. This is small progress in relation to other professions, and only modest progress in relation to the cost of living. The President's Committee on Education Beyond the High School urges that salaries should be at least doubled within the next 5 to 10 years. Even so, our professors would still be behind those in Russia, who rank in the comforts of living with company presidents here.

In Europe there has always been surprising uniformity in standards of school curricula. Here we lack a national standard for curricula, graduation examinations, diplomas, or teacher qualifications, and consequently our school systems range from poor to excellent. We are beginning to realize that as we approach European conditions through population growth, we must educate our children better or down-grade our standard of living.

Encouragingly, basic research is getting more attention from our industry, university, and government, but it still lags behind applied research. This year only $200-million, of a total of $9-billion for all research, will be for basic research.

With more emphasis on its importance, perhaps more chemists will want to do "long-haired work." Until now, most have been inclined toward industrial research. The importance of fundamental investigation received unanimous agreement at the AAAS Parliament of Science in Washington. These top-ranking scientists made history-making statements on the support of science; the nation's scientific effort; communication among scientists; selection, guidance, and assistance of students, and the improvement of education.

Though there is no "international chemist", there is a close bond of friendship between chemists of all countries, which our chemists visiting in Europe and behind the Iron Curtain have found. In the many countries I have visited, I have been treated with courtesy and kindness by all scientists. And everywhere, chemists and chemical engineers have one thing in common. They strive for the advancement of their professional status, which is the number one purpose of the AIC.

Dr. Albert C. Zettlemoyer, F.A.I.C., professor of chemistry at Lehigh University, Bethlehem, Pa., has been named a Sigma Xi national lecturer. He is delivering a series of lectures at 25 colleges and universities and eight industrial centers.

Erwin C. Hoeman, F.A.I.C., is now supervising general engineer, U. S. Army Chemical Corps Desert Test Activity, Yuma Test Station, Arizona.

J. K. Roberts, F.A.I.C., director and vice president of Standard Oil Co., (Indiana), is chairman of the Program Coordination Committee and the U. S. National Committee for the Fifth World Petroleum Congress to be held in New York in June, 1959.

Dr. Ernest H. Volwiler, Hon. AIC, president and general manager of Abbott Laboratories, North Chicago, Ill., received the Priestly Medal of the American Chemical Society at the San Francisco meeting, April 14.

Henry G. Sellers, Jr., F.A.I.C., was recently appointed assistant director of research of ORRadio Industries, Inc., Opelika, Alabama.

Raymond Stevens, Hon. AIC, president of Arthur D. Little, Inc., Cambridge 42, Mass., has assumed the duties of chief executive officer. He reports that the ADL staff grew during 1957 to 988 full-time members.

Publicizing the Accomplishments of the Chemist and the Chemical Engineer

(How to Inform the Public)

F. J. Van Antwerpen

Executive Secretary, American Institute of Chemical Engineers, 25 West 45th St., New York, N. Y.

(Condensation of a paper presented by Lee Van Horn, vice president, The Fluor Corporation, at the 35th Annual AIC Meeting, April 11, 1958, at Los Angeles, Calif.)

PUBLIC relations concerns the contacts an organization or individual has with different groups of people—the various 'publics'. Its purpose is to gain their confidence and support. It is a function of management. One of its chief tools is publicity, the preparation and dissemination of news about a project, achievement, product, industry, person or professional society. Good objectives plus good policies carried out by good performance and aided by good publicity add up to good public relations.

The intense public interest in satellites, missiles, outer space and survival, has projected the scientist and engineer into front-page news, a sudden development which should have happened long ago. We hope this interest and the resulting prestige will continue, but we can do more than hope. As representatives of professional groups, we can act in three ways:

We can implement a public relations program of our own, utilizing mass media (newspapers, magazines, radio, TV, etc.) to keep people informed about the scientific and engineering developments which constantly affect their lives. Thus we can instill in the public mind concern with these things and with the men who participate in them. Second, we can vitalize the interest of men already in our organization and attract qualified young people into the profession and subsequently into the professional societies. Third, by emphasizing to the business world the far-reaching industrial contributions and the professional standing of the chemical engineer and chemist, we can do much to give them a solid basis of recognition and respect. This is vital because of the science-fiction overtones of recent events.

These events have caused the mass media to give science and engineering so much time and space recently. But we cannot expect a continuous flow of the dramatic to incite imagination or stir fear so that people will exhibit frantic interest in the sciences as a means of survival. Nor is a continuance of the dramatic wholly desirable because of the warped picture of the sciences that can easily result. However, to the public the work of the chemical engineer is seldom spectacu-

lar, so we shall not object if some of the prevalent glamour rubs off on him. In fact, we can use the satellite-inspired popularity of the scientist as a springboard for an increased public relations program to give a truer picture of what we do. It is unfortunate that the scientist and engineer had almost to burst upon the public scene; that people were not all along informed of what was happening on the technological front, and that we did not do more to provide the communications media with information about ourselves, our work and its future consequences. But it is not too late.

We can show the people how many things in this world and out, from ice cream to space vehicles, are dependent upon the work of the chemist and chemical engineer. The many conveniences and essentials of life are taken for granted by the public, unaware of the men and women of engineering and science who make them possible. We can tell them of the intelligence, ingenuity, perseverance, and plain work and sweat, that go into the marvels of everyday living which science and engineering have made available to, and within the means of, millions of people. We can tell them what to expect and who will be responsible. This emphasis on how vital chemical engineering and chemistry are to civilization, resulting in public recognition and support, will ensure the vitality of the profession.

The personnel of the communications media will be receptive and even grateful for our publicity efforts; especially the science editors and writers who wish to keep alert to the achievements of the chemist and the chemical engineer. Louis Wiley, late business manager of *The New York Times* indicated that publicity, *if it is newsworthy,* is published even if it benefits private interests. So the dissemination of publicity becomes a process of mutual benefit to those who issue it; to those who publish or air it, and to those who read, hear or see it.

As scientists and engineers we have to open up more; to take the initiative in creating a wider area of understanding between us, the editor, and the layman. We must learn to talk the other fellow's language; to come out of the confines of our professionally bound areas and circulate; to liberate ourselves a little more from the reluctance, induced by scientific training, to say anything too definite or controversial.

Nor should we become too glamour-conscious. Publicity can be a two-edged sword. The concept, "It doesn't matter what they print as long as they spell our name right," is a dangerous one. Publicity must be prepared by persons who know their business; released to the right places at the right time, and, if necessary, followed up. Great care should be taken not to go off half-cocked. A proper amount of restraint (but not too much) and a

fine respect for truth should be our guideposts.

In considering some of the aspects of a public relations program for the professions of the chemist and the chemical engineer, we should ask, Who are the people toward whom we should direct our public relations activities? The various publics for our purpose may be identified as: (1) Members of the professions. (2) Students. (3) Business and industry. (4) General public.

The character of public relations will vary according to the group. That for the general public will be less technical than that for men in the profession or in industrial organizations. Internal publicity is that which is directed to the publics within the proession or the society. There is no more valuable public relations than information purveyed interestingly to the members of engineering and scientific organizations about what their fellow members are achieving. Helpful ideas are thus interchanged, and the engineer or scientist tends to identify himself more strongly with both the profession and the organization. This also applies to publicity within a plant, company, or industry. News about an honor conferred upon a member not only encourages him but redounds to the credit of his company or organization. When employees are kept informed they often feel that they are sharing in the company's progress.

All of those engaged in the public relations activities of an organization must be fully familiar with that organization. Too often public relations personnel operate with "blind spots" and attempt to bluff their way through. Disseminating only factual, valid information is of paramount importance. Such practice instills confidence in those who publish or distribute information, and it greatly reduces the possibility of distortion or misunderstanding by the public.

The public relations committee should know the background of the organization and the history and nature of the field it serves. Members of the P.R. Committee of A.I.Ch.E., for example, should have knowledge of the beginning of engineering, and chemical engineering in particular; the definition of engineering; how the engineer differs from and works with the scientist; who the first notable engineers were and their accomplishments, and the present extent of engineering and its effect on our way of life. The Committee should also be able to release information and answer inquiries on the Institute; who

were among its first members; what its early activities and accomplishments were, and how and at what rate it is growing.

Other important things which the public relations man in a professional society should know are: (1) The principal objectives of the organization. (2) The constitution and bylaws. (3) The organization and administration of the society on a national and local level and the coordination of the activities of the two levels. (4) The main activities of the society with special attention to meetings, student activities, publications, and presentation of awards. (5) Membership classifications and qualifications. (6) Advantages offered by the society to the individual and the profession.

The execution of a society's public relations activities on a national level may be assigned to a special committee which establishes policy, decides on procedures, coordinates P.R. activities, and stimulates P.R. programs at local levels. An effective program will employ as many of the methods for reaching the various publics as possible.

The individual society member is a public relations representative in the first line of P.R. activity. There is no substitute for personal contact, so that the spontaneous impression he makes as a member of an organization and his profession is often decisive in determining a public relations climate, particularly when he is contacting prospective members. Therefore, it is important that the P.R. committees enlist him as a member of the "P.R. team", by nourishing his interest in the society and by keeping him informed. A truly interested and informed member will also be more active in the society's internal affairs.

Written publicity released to the main communications media is one of the principal tools of public relations. This material should, where possible, be supplemented by photographs.

Arranging interviews on radio or TV for members, official, or prominent personalities attending the group's functions, is another effective means of publicizing the profession.

Press conferences may be arranged for interview purposes. This involves inviting members of the communication media to a conference where individuals, who have some particularly newsworthy information to deliver to the public, may be questioned.

Special literature in the form of booklets, pamphlets, and brochures may be prepared. The local P.R. group may also prepare newsletters, notices, and leaflets for distribution to members, prospective members, and the general public.

Community participation should be undertaken and publicized by the local committee. This may include activities with sections of other societies, contact and cordial relations with local industry, or taking part in such community functions as Engineers Week, Chemical Progress week, high

school guidance programs.

Special promotions can be planned by enterprising P. R. committees. These can be technical or social events or projects, or a combination. High school students might be invited to a local group's "open house" to meet engineers and chemists who may interest them in careers in the professions.

Public speaking is an effective direct method in P.R. Sections may form small speakers' bureaus to speak to members about the P.R. program and to appear before community groups to explain the professions. Prominent persons may also be invited to speak at local meetings. These appearances should be fully publicized.

Public relations does not call for rigid, narrow thinking. Those responsible for public relations should be constantly vigilant in seeking better means of implementing their activities. General instructions fulfill a constructive purpose, but specific needs determine the character of the program.

Every member of the committee, and every society member, should be encouraged to offer suggestions for the program and should be canvassed for opinions on its effectiveness. The program should be reviewed periodically, and should be flexible enough to allow for the grasping of new opportunities or ideas as they arise.

A wise P.R. committee will stay attuned to public attitudes, which sometimes change suddenly. Care should be taken that P.R. activities are not misdirected or wasted. After a specific goal has been achieved, maintaining that goal calls for different techniques from those used to reach it. Public relations men must keep a constant "ear to the ground" and should:

(1) Keep in close touch with members.
(2) Use other departments of the group as listening posts.
(3) Hold regular public relations conferences with other officials.
(4) Scan and clip publications to get an idea of P.R. results and a current sounding of public opinion.

Trouble prevention should not be overlooked by the P.R. committee, whose program should be flexible enough to "put out fires." Therefore, the committee should:

(1) Take pains to make friends of the press. Encourage editors to contact the committee whenever they get hold of information concerning the society or the profession.
(2) Channel press contact with the profession through the P.R. committee.
(3) Identify the society, the local group, and the profession with the welfare of the nation and the community.
(4) Double and triple check all information released.

All these activities are necessary because we have something important to say; we have a definite responsibility to the public at large, to our profession, and to ourselves. We as chemical engineers and chemists pride ourselves on being modern men, the men who open new frontiers. We strive to use the latest techniques and knowledge in our professional work. It behooves us to employ all the modern methods we can, non-technical as well as technical, to help us in our public relations, so that we may get our message across.

Opportunities

Doris Eager, M.A.I.C.

Positions Available

Chemists & Chemical Engineers. Experienced in combustion phenomena, physical chemistry, propellants, heat transmission, and thermodynamics. Write direct Lockheed Aircraft Corp., 745 Chrysler Bldg., New York 17, N. Y. or Sunnyvale, California.

"Scientists of scientific bent", men with 2 to 15 years experience, having a doctorate in organic chemistry and pertinent practical experience. Knowledge of petrochemicals, especially monomers and polymers, desirable. Petroleum company wishes to emphasize product development rather than process development. Box 61, THE CHEMIST.

Senior Organic Chemist. Ph.D. Organic Chemistry 2 to 5 years' experience, background in polymer chemistry, synthesis experience, aromatic and essential oil knowledge helpful. **Senior Polymer Chemist.** Ph.D. Physical-Organic Chemistry, 2 to 5 years experience, background in polyethylene and/or vinyls desirable, protective and decorative coatings of interest. **Senior Physical Chemist.** Ph.D. Physical Chemistry 2 to 5 years' experience, background in adhesives, electrochemistry, ion exchange, or water and waste treatment. **Senior Biochemist.** Ph.D. biochemistry and microbiology, or organic chemistry, 2 to 5 years' experience in research and development. Senior positions involve surveys of new fields, planning and carrying out bench-scale work, process and product development, supervisory responsibilties. Location east. Box 63, THE CHEMIST.

Chemists Available

Organic Chemist. F.A.I.C. Experienced in organic synthesis, preparation and application of polymers, surface active agents, and wood chemistry. Available short notice. Box 64, THE CHEMIST.

Chemist, young, single, desires position in New York City. Experience includes sales, public relations, personnel, teaching. Part time or temporary position acceptable. Box 66, THE CHEMIST.

Chemist. Detergents and chemical specialties. Diversified experience ranging from plant through research supervision. Box 60, THE CHEMIST.

Chemist. Exploratory research in polymers. Creative work assured. Desires challenging position. Box 62, THE CHEMIST.

"The Heat Is On"

Gen. John E. Hull, USA (Ret.), speaking before the Salesmen's Association of the American Chemical Industry, said, "The heat is on the . . . chemical industry from a number of quarters," and that the fast moving expansion throughout the chemical field is being imperiled as a result of current popular misconceptions on the part of legislators and the public. Gen. Hull, who is president of the Manufacturing Chemists' Association, urged everyone in the chemical industry to accelerate public information activities.

The Chemists' Participation in Community Activities

Wyatte F. De Loache

Manager, Pacific Coast Extension Division, Public Relations Department, E. I. du Pont de Nemours & Co., Menlo Park, Calif.

(Condensation of a paper presented at the 35th Annual AIC Meeting, April 11, 1958, at Los Angeles, Calif.)

NEITHER science nor the particular field of chemistry is any more or less important today than before the earth satellites were launched: The change is in the public attitude. People now are willing to listen, willing to believe the wonderful, factual story that science has to tell.

The chemist can best contribute to his community understanding, understanding for all — of his job, its significance to better living, and how the continued productive use of his knowledge can be possible, but is not assured.

Most scientists know that their dreams for serving the material needs of this country become a reality only through the most complicated of circumstances. From the mind of man to the test tube, to commercial reality, calls for the refinements of education, the opportunity for free scientific pursuit, and a complex business establishment—all working together within a society and a system of government which encourages each. But all of our friends and neighbors do not know this. Why not tell them?

Consider the chemist himself. America (and perhaps other countries) is inclined to brand groups of people according to precise, rarely-flattering types. Type-casting, so to speak, is a national pastime. The absent-minded professor is still with us. The popular stereotype of a newspaperman is a brash individual with hatbrim furled, language coarse, and ethics questionable.

Too many people, who consider themselves well-informed about chemistry because they recall whipping up a batch of hydrogen sulfide in a high school lab, have cast the chemist in a role complete to the evil-smelling glassware in the laboratory. Usually he is peering closely at his paraphernalia through hornrimmed spectacles with thick lenses. If he is not baldheaded, his hair is uncut and uncombed. He wears a smock, but usually a dirty one. All in all, an indignifying spectacle more calculated to inspire apprehension than respect and admiration! But this profession is not the only one to bear the onus of frivolous typecasting! Never do I remember reading a book or seeing a movie about a successful business leader who was a wise, warm-hearted and

righteous person. Our literature, plays, television dramas and movie scenarios suggest that trickery and fraud are the prime requirements for success in the business world; that the captains of industry and commerce attained eminence by back-stabbing, deceit, and other caprices on the wrong side of the ledger of human relations. Business leaders, newspapermen and college professors are just groups of people, and groups of people cannot be stereotyped.

As for chemists looking and behaving like weird eccentrics, this apparition becomes strange when compared with chemists of genuine competence whom I know. One plays chess; another is a fair hand at billiards; one blows trumpet in a Dixieland band; some sing in church choirs. One is chairman of a school board, another prefers to sit at home reading Spinoza. One is on his way to alcoholism, several are tee-totalers. About all they have in common is the proud right of a Ph.D. after their names. Having been taken in once with the public stereotype of a chemist, I made the surprising discovery that a Ph.D. in science can be, and usually is, a pretty regular guy.

Even as the chemist suffers from public misconception, there is a lack of understanding of the contribution of his scientific discipline to the world we live in . . . The non-scientist needs frequently to be reminded that man's ability to improve his material comforts is no better than his ability to put science to work for him. He is no warmer in the cold of winter than the heat he can obtain; nor is that beverage he enjoys at the end of a hot day any colder than the application of his knowledge of refrigeration.

In this country, science is the handmaiden of progress, not just an instrument of national security. In America progress demands the utilization of scientific knowledge. It follows then, that the pursuit of scientific knowledge is one of the most persistent and continuing impulses of our times. Neither this country, nor that, has a copyright on knowledge. It is available to almost anyone who is willing and able ardently to pursue it. It is free to be developed, free to be expanded upon. Some countries do just that, the United States particularly for it has harnessed science to its needs on a scale so vast it literally defies comprehension.

The United States has made more material progress in the past century and a half than ever was made in all previous time. When we begin to consider why we have been able to harness science on so vast and fruitful a scale, here again we find evidence of many misconceptions, and again it is an area to which the scientist himself can contribute understanding.

A wise Frenchman made the dramatic announcement, some 125 years ago, that Americans were changing the "whole order of nature to their own advantage." He was Alexis de Toqueville, who tried to explain that

a principal reason for America's great material gains was the application of science to production. Though Mr. de Tocqueville observed this back in 1840, I wonder whether the majority of Americans understand our production machine as well today as he did more than a century ago!

The productive use of scientific knowledge is not a simple undertaking, it is amazingly complicated. Time was when an individual might originate the idea for something new, make it, and use it. No doubt, that ingenious farmer on the Persian Gulf back in 3500 B.C., who is credited with introducing the benefits of the first wheel, was the same man who dreamed up the idea, then used a cross-section of a log to prove its usefulness. But today, carrying an idea from the mind of man to commercial reality is a vast team effort, often requiring the specialized skills of hundreds, sometimes thousands, of people, and scores of different business firms of all sizes. No matter what the idea, or the product, if it is a truly significant one, at least three wide fields of human effort must be coordinated. Not even a yo-yo could reach the dime-store counter without three of them. First is the field of science itself; then there is invention; and finally, the field we call technology.

In the realm of science, the scholar and his role has remained essentially unchanged through history. He is still the man we respect as the "scientist" in the purest sense. He may follow his quest for knowledge in the laboratories of a tree-shaded college campus, at a busy industrial site, or in private or governmental facilities. He provides fundamental understanding about the forces of nature; he investigates to learn. When he is seeking knowledge merely for its own sake, as many do, whatever is done with his findings is frequently neither his responsibility nor immediate concern.

But knowledge is not enough. It must be translated into terms of usefulness and put to work for the good of man. So we have the second area of effort called invention, or the inventor. He gives usefulness to the ideas developed by the scientist. The inventor, too, pursues his work under different auspices — sometimes alone, sometimes as an employee, or even as an employer of his own enterprise.

The third area, technology, is where the technologist, often unsung and unheralded, transforms knowledge and invention into products and processes. His name is rarely known,

but his accomplishments speak eloquently about him. The technologist begins with only a crude steam engine, and in 50 years spans a continent with railroads. He takes an electro-magnetic wave, and within a generation fills our living room with symphonic music from faraway places. He is one of the doers of this world.

The uncommon man, the extraordinary individual, the man whose lamp burns late in the night in search of new knowledge or in better ways of things, is fundamental to continued progress. But he needs help, and he needs it in uncommon amounts. He needs the knowledge that others have learned before him, and that others are developing even as he is at work. He needs financial help in tremendous sums. He needs additional skills, 100-fold different from his own, in order to have his dream serve mankind.

Fortunately, this country has a business establishment whose very existence is dedicated to the thesis that science shall serve the needs of man. This business establishment is an establishment in much the same sense that the nation has its educational establishment, its religious establishment, and its military establishment. Each is composed of units of varying size; but all go to make up a gigantic team that we call an establishment.

To correlate the efforts of the scientist, the inventor, and the technologist, the entire business establishment is needed. No one firm is big enough or small enough to do the job. It requires firms of all sizes. Certainly within my own company we find an abounding need for a business establishment with firms of all sizes. In World War II, as part of the so-called Manhattan Project, Du Pont was asked to build and operate the Hanford Plant. It was then the largest single industrial undertaking in history. Presumably, the government tagged us for the job because, among other things, we were big enough to handle it. In this case, as in almost any other, being big enough simply meant big enough to know how to go elsewhere for help when needed. The Hanford job would never have been successful without the direct contributions of hundreds of other firms ranging in size from one-man shops to corporations bigger than Du Pont.

In the field of domestic, peacetime consumption, we introduced a synthetic polyester fiber, "Dacron", several years ago. It took $80-million to get it into commercial production, patently a job best done by a firm big enough to assemble the necessary talent, and with sufficient financial resources. "Dacron" can also be described as a success, but it might still be cluttering up warehouses, if hundreds of other business firms of all sizes had not been able to weave, dye, and convert it to something the consumer considers useful. Du Pont, as buyer or seller, does business with

some 100,000 separate business firms, of which 95 per cent are classified as small business. Without them, neither Du Pont nor its products would exist.

Much has been said about small businessmen not having a chance any more because of the increasing number and size of the large firms; we hear reports, some exaggerated, of the number of small business failures. Behind this there seems to be the suggestion that it is either the blame of the big firms, or that the widespread collapse of small business would be pleasing to the big corporation. This concept is ridiculous in light of the certain fact that every large firm depends upon small business for its very existence.

Misunderstandings do exist. Continued, their consequences can be disastrous. Misunderstanding leads first to suspicion, then to distrust, finally to hostility. Misunderstanding of science and education at the distrust stage is reflected in recent public proposals which would rigidly prescribe certain avenues of knowledge which our young people must pursue. Misunderstanding of big business at the hostility stage is reflected in some legislative proposals which would impose a heavy tax penalty on success. Such proposals would at best accomplish short-range gains for the few to the long-range detriment of us all, and they result from misunderstanding.

Does it not then behoove the scientist, the businessman, or anyone who, through exposure, understands how our system works, to explain it whenever he can? There is no finer contribution that the chemist can make to his community than one of understanding.

It is the productive use of scientific knowledge which has helped make this country great, with science as the fountainhead of knowledge, and with business firms of all sizes to translate that knowledge into usefulness. The material contribution of the chemist to his fellowman is overwhelming and all-pervasive. Fortunately, it is not difficut to explain to anyone. The teamwork between science and industry is not less pervasive, no less important, but it is not as easily explained for it is not as well understood.

Scientist or non-scientist, chemist or paleontologist, let us resolve that this country shall not lose through misunderstanding what no one has been able to take away from us by force — our heritage of freedom.

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Highlights of the February Meeting

The 319th meeting of the National Council was held Feb. 18, 1958, at 6:00 p.m. at The Chemists' Club, New York, N. Y., with President H. B. Hass presiding. The following officers, councilors, or alternates, were present: Messrs.: M. Bender, M. Berdick, L. A. Hall, H. B. Hass, K. M. Herstein, F. A. Hessel, D. B. Keyes, J. H. Nair, E. Ott, H. Robinette, Jr., G. L. Royer, L. Van Doren, and M. B. Williams. L. T. Eby, chairman of the Membership Committee; C. E. Feazel, chairman of the Alabama Chapter, and V. F. Kimball were present.

The Treasurer's report was accepted. The cost of the publication of the Directory of Members, above the advertising receipts, was authorized to be paid from reserve funds.

The Secretary reported with deep regret the deaths of the following members:

Wesley R. Gerges, F.A.I.C., on December 15, 1957.

Dr. Ralph T. Nazzaro, F.A.I.C., on January 21, 1958.

Dr. Elizabeth Pomerene, F.A.I.C., on February 3, 1958.

A moment of silence was observed in their memory.

The Secretary reported that the membership numbered 2874.

An invitation from the Twin City Chapter to hold the 1960 Annual Meeting in Minneapolis, Minn., was referred to the Planning Committee.

The Committee on Honorary Membership recommended that Honorary Membership be given during the 1958-1959 fiscal year to Dr. Foster D. Snell and Dr. Lloyd A. Hall; the announcement to be made at the 35th Annual Meeting. These recommendations were approved.

Dr. Ott, chairman of the committee on Ethics, reported that, after consideration, his Committee recommended that steps be taken to print the Code of Ethics in a form suitable for framing, and that these be made available to members at a cost sufficient to cover the expense.

Dr. Hall announced that the Chicago Chapter was preparing a survey of salaries in the Chicago area and that this report would be made available for publication in THE CHEMIST.

The Committee on Qualifications presented a revised form of application blank and reference form, and these were approved for printing.

A lively discussion of ways in which the membership could be made more familiar with AIC objectives followed the progress report presented by Dr. Hall, as chairman of the Committee to Implement the Objectives of the AIC. It was agreed that the formation of more Chapters would enable members to participate more fully in AIC activities. The present geographical area covered by many Chapters is too great to enable members from remote sections to attend regular meetings.

The following new members were elected:

FELLOWS

Ashley, Samuel E. Q.
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Carroll, Dr. Hugh S.
Technical Advisor to the Philippine Government, ICA State Dept., Washington, D. C.

Davidson, Dr. William L.
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Greenspan, Dr. Frank P.
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MacLeod, John W., Jr.
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McNutt, William P.
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Miller, Dr. Clem O.
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MEMBERS

Hall, Harry L.
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Klobus, John A.
Chemist, Hercules Powder Company, Bessemer, Alabama.

Nyman, Frederick R.
Physical Chemist, U. S. Army Ballistic Missile Agency, Huntsville, Alabama.

Rockwell, James N.
Research Chemist, Newport Industries Company, P.O. Drawer 911, Pensacola, Florida.

Wikle, A. Melvin, Jr.
Engineer, specifications, rockets & components, Thiokol Chemical Corp., Redstone Division, Huntsville, Alabama.

ASSOCIATES

Key, Carlo "Frank"
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Chemical Engineering Assistant, Army Ballistic Missile Agency, Det. A.U.S., Huntsville, Alabama.

Summerlin, Lee Roy, II
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RAISED FROM MEMBER TO FELLOW

Le Fave, Gene M.
Chief Chemist, Coast Pro-Seal & Mfg. Co., 1507 Grande Vista Ave., Los Angeles 23, Calif.

REINSTATED AS A MEMBER

Schachtmeister, Sydney C.
Chemist & Food Sanitarian, Certified Labs., Inc., 19 Hudson Street, New York, N. Y.

Ibert Mellan, F.A.I.C., has been appointed senior research chemist of Polychrome Corp., Yonkers, N. Y.

Dr. L. P. Moore, F.A.I.C., recently elected president of North American Cyanamid Ltd., announces that the company has changed its name to Cyanamid of Canada, Ltd., with headquarters in Montreal.